

REMARKS

This Amendment is filed in response to the Office Action mailed on June 14, 2007. All objections and rejections are respectfully traversed.

Claims 38 – 45, 51, and 54 are pending in the case.

Request for Interview

The Applicant respectfully requests a telephonic interview with the Examiner after the Examiner has had an opportunity to consider this Amendment, but before the issuance of the next Office Action. The Applicant may be reached at 617-951-3067.

Claim Rejections – 35 U.S.C. §112

At paragraphs 1 and 2 of the Office Action, claims 51 and 54 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Specifically the Examiner states that steps (E) to (H) are not present in the specification as originally filed.

Applicant respectfully urges that steps (E) through (H) are shown sufficiently to meet with the written description requirement. Element (E) recites “providing a first opening being an air inlet for the introduction of oxygen into the anode chamber.” In figure 6, element 70 shows the air intake and the specification states that oxygen is taken from ambient air. (page 12, lines 13-18, page 2, line 10). Element (F) recites “providing a second opening being a separate fuel inlet for the introduction of fuel into said anode

chamber. In figure 6, element 69 shows the fuel inlet. (page 12, lines 13-18). Element (G) recites “detachably connecting a load across said membrane electrode assembly” and is shown at specification page 9, lines 8-10 and specification page 12, line 1 line 25 to page 13, line 3. Additionally, specification page 12, line 1 line 25 to page 13, line 3 show support for element (H) which recites “introducing fuel and oxygen into said anode chamber to oxidize said fuel to produce water, and detaching said load such that the system produces no electricity.”

The Examiner states that paragraph 41 states that water is produced and air is prevented from entering the anode chamber. Applicant respectfully urges that paragraph 41 discloses two operation modes, and what the Examiner points to is the second operation mode. The second operation mode is a classic fuel cell mode wherein methanol and water react in the first reaction at the anode which produces electricity and CO₂, and at the cathode water is produced. In the first operation mode, the reaction between the methanol and the oxygen oxidizes completely to create water and CO₂ when there is no load to complete the circuit. Accordingly, Applicant respectfully urges that claims 51 and 54 are allowable over the §112, paragraph 1 rejection.

At paragraph 3 of the Office Action, claims 51 and 54 were rejected under 35 U.S.C. §112, first paragraph as failing to comply with the enablement requirement. Specifically, the Examiner states that detaching the load from the water generator/DMFC system does not cause the system not to generate electricity.

Applicant respectfully urges that a person skilled in the art would understand that when the system runs in a first operation mode and there is no load connected the oxygen

and the methanol oxidize completely into water and CO₂, as there is no place for the electrons to flow. Accordingly, Applicant respectfully urges that claims 51 and 54 are allowable over the §112, paragraph 1 rejection.

At paragraphs 4-6 of the Office Action, claim 41 was rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Specifically, the Examiner stated that “said second opening” does not have sufficient antecedent basis.

Applicant respectfully urges that claim 41 has sufficient antecedent basis. The said second opening is introduced in claim 38 at line 38. Claim 41 depends on claim 38 through claim 40. Accordingly, claim 41 is believed allowable over the §112, second paragraph rejection.

Claim Rejections – 35 U.S.C. §103

At paragraphs 7-8 of the Office Action, claims 38-43 were rejected under 35 U.S.C. §103 as being unpatentable over Wilkinson et al., US Patent No. 6,682,839, hereinafter Wilkinson, and in view of Nakamura, Japanese Patent No. JP356114284, hereinafter Nakamura.

The present invention, as set forth in representative claim 38, comprises in part:

38. A direct oxidation fuel cell and water generating system, comprising:
a housing;
a source of fuel in fluid communication with said housing,
wherein the fuel is substantially composed of pure methanol;
a source of oxygen in fluid communication with said housing;
a membrane electrode assembly having a catalyzed membrane electrolyte, with an anode aspect and a cathode aspect, disposed within

said housing, an anode chamber being defined between said anode aspect of the catalyzed membrane electrolyte and a first exterior portion of said housing, and a cathode chamber being defined between said cathode aspect of the catalyzed membrane electrolyte and a second exterior portion of said housing; and

a plurality of openings, a first opening being an air inlet allowing air introduction into said anode chamber, and a second opening being a separate fuel inlet allowing introduction of fuel into said anode chamber, such that when air and fuel are introduced into said anode chamber, fuel is oxidized on said anode aspect into water and carbon dioxide, said anode chamber further including an opening through which carbon dioxide exits.

As stated in earlier prosecution, Wilkinson describes a method of controlling the temperature of a fuel cell stack using a heat exchanging mechanism. Wilkinson does not teach generating water that may be used in another fuel cell or in another manner as in Applicant's claimed invention. The Examiner discusses the oxidant supply manifold 34 as taught by Wilkinson which directs the oxidant fluid stream to oxidant fluid passages of each individual fuel cell assemblies as described in Col. 8, lines 56 – 65. However it is noted that this cited passage from Wilkinson goes on to state that: "In turn, oxidant fluid passages direct the oxidant fluid stream to *cathode 22* such that the oxidant contacts electrocatalyst 28." (Col. 8, lines 64-66) (Emphasis added). Furthermore, Wilkinson is silent as to carbon dioxide management.

Nakamura discloses a starting device for a methanol fuel cell where a blower is used to provide air to the methanol fuel, and where a catalytic combustion at the surface of the anode (fuel electrode) rapidly heats the fuel electrode. (page 4, paragraphs 5 and 6) Water and CO₂ generated by the reactions are discharged externally as gases from the inlets.

Applicant respectfully urges that Wilkinson and Nakamura, taken alone or in combination, do not teach or suggest Applicant's claimed novel *a source of fuel in fluid communication with said housing, wherein the fuel is substantially composed of pure methanol, ..., a plurality of openings, a first opening being an air inlet allowing air introduction into said anode chamber, and a second opening being a separate fuel inlet allowing introduction of fuel into said anode chamber, such that when air and fuel are introduced into said anode chamber, fuel is oxidized on said anode aspect into water and carbon dioxide, said anode chamber further including an opening through which carbon dioxide exits.* In further detail, in Applicant's claimed invention, uses oxygen in the air to create water for use in reactions with the pure methanol. Applicant's system creates water from the pure methanol to allow for a smaller device than using diluted methanol. In contrast neither Wilkinson nor Nakamura disclose using pure methanol. Wilkinson discloses using aqueous methanol or 33% methanol. Nakamura does not disclose what concentration of methanol but because the water is discharged externally then it is not necessary to use pure methanol. Furthermore, Nakamura discloses that a catalytic combustion at the surface of the anode creates heat, and not that the fuel is oxidized to create water. Nakamura wants to use the extra electrons to create heat on the electrode, where Applicant's goal is to create water for use in the anode cathode reaction.

Accordingly, Applicant respectfully urges that Wilkinson and Nakamura, taken alone or in combination, are legally insufficient to make obvious the presently claimed invention under 35 U.S.C. § 103 because of the absence of the Applicant's claimed novel *a source of fuel in fluid communication with said housing, wherein the fuel is substan-*

tially composed of pure methanol, ..., a plurality of openings, a first opening being an air inlet allowing air introduction into said anode chamber, and a second opening being a separate fuel inlet allowing introduction of fuel into said anode chamber, such that when air and fuel are introduced into said anode chamber, fuel is oxidized on said anode aspect into water and carbon dioxide, said anode chamber further including an opening through which carbon dioxide exits.

At paragraph 9 of the Office Action, claim 45 was rejected under 35 U.S.C. §103 as being unpatentable over Wilkinson, in view of Nakamura, and in view of Tillmetz et al., US Patent No. 6,410,175, hereinafter Tillmetz.

With respect to Tillmetz, the Tillmetz reference also relates to reformer-based hydrogen fuel cells that require a reformer, not taught by Applicant. Applicant's invention relates to direct methanol fuel cells that do not require a reformer. Furthermore, though Tillmetz teaches two fuel cell stacks and mentions that "product" water can be used, this product water (as found inherent by the Examiner) would be produced on the cathode side of the fuel cell. Tillmetz contains no teaching that fuel and oxygen be reacted on the anode side into water and this water so generated is supplied to a second direct oxidation fuel cell. Tillmetz uses the methanol fuel on start up to produce a hydrogen gas fuel stream that is supplied to a different hydrogen fuel cell stack. Tillmetz does not teach generating water at an anode side of a first fuel cell and supplying this water to a second fuel cell in the manner claimed by Applicant. Accordingly, claim 45 is believed allowable in view of the above arguments.

At paragraph 10 of the Office Action, claim 44 was rejected under 35 U.S.C. §103 as being unpatentable over Wilkinson, in view of Nakamura, and in view of Grasso et al., US Patent No. 6,475,652, hereinafter Grasso.

Applicant respectfully notes that claim 44 is a dependent claim that depends from independent claim that is believed to be in condition for allowance. Accordingly, claim 44 is believed to be in condition for allowance.

All independent claims are believed to be in condition for allowance.

All dependent claims are believed to be dependent from allowable independent claims.

Applicant respectfully solicits favorable action.

Please charge any additional fee occasioned by this paper to our Deposit Account No. 03-1237.

Respectfully submitted,

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